

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference FNTYA024WO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/JP2004/011005	International filing date (day/month/year) 26.07.2004	Priority date (day/month/year) 29.07.2003	
International Patent Classification (IPC) or national classification and IPC B60T8/00, B60T7/12, B60L15/20			
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 20.05.2005		Date of completion of this report 07.11.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Marx, W Telephone No. +49 89 2399-2722	



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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-20 as originally filed

Claims, Numbers

1-9 as originally filed
10-12 received on 27.05.2005

Drawings, Sheets

1/7-7/7 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☒ the claims, Nos. 10-12
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-9
	No: Claims	
Inventive step (IS)	Yes: Claims	1-9
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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Re Item I.

The amendments filed with the letter received on 27.05.2005 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following:

Claim 10: The application as filed does not show the feature of an electric motor that is capable of "inputting power from said drive shaft.

Claim 11: A "third shaft" and the determination of "power input into and output from a residual shaft" are not disclosed in the application as filed.

Claim 12: The expression "electromagnetic interaction" cannot be found in the application as filed.

Re Item V.

1. The following documents are referred to in this communication:

D1: DE 198 37 373 A (CONTINENTAL TEVES AG & CO OHG) 24 February 2000 (2000-02-24)

D2: EP 1 225 110 A (TOYOTA MOTOR CO LTD) 24 July 2002 (2002-07-24)

D3: EP 1 147 959 A (BOSCH GMBH ROBERT) 24 October 2001 (2001-10-24)

D4: GB-A-2 377 475 (BAYERISCHE MOTOREN WERKE AG ; BOSCH GMBH ROBERT (DE); ZAHNRADFABRIK FR) 15 January 2003 (2003-01-15)

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject matter of independent claims 1 and 9 does not involve an inventive step in the sense of Article 33(3)PCT.

2.1 Document D2, which is considered to represent the most relevant state of the art to the subject matter of claim 1, discloses (the references in parenthesis applying to this document):

- a vehicle equipped with a power output device that is capable of outputting a driving force to a drive shaft linked with drive wheels (Fig.1: engine 1 and drive shaft 4F or 4R), said vehicle comprising
- a mechanical braking device that is capable of applying a mechanical braking force to said vehicle (Fig.1: braking system 20 with wheel cylinder 21 and master cylinder 30)
- a slip detection module that detects a slip caused by spin of the drive wheels (col. 20, line 28-33 and Fig. 8: step S310 with NO-decision leading to S314)
- a slip-down detection module that detects a slip-down of said vehicle (col.19, line 48-50; also step S514 in Fig. 10, which shows details of S314 of Fig. 8)
- a controller that actuates and controls **said mechanical braking device** in response to detection of a slip by said slip detection module (col. 21, line 25-27 and Fig. 10),
- said controller actuating and controlling said mechanical braking device to apply a mechanical braking force to said vehicle in response to detection of a slip-down of said vehicle by said slip-down detection module (Fig. 10).

To summarize, D2 clearly shows in Fig. 10 (see also col. 23, line 2-5) a special brake control routine executed when the vehicle is slipping backwards while a wheel is spinning, meaning that a special traction control situation is considered with a vehicle slipping backwards.

Note: The expression "under restricting the driving force output to the drive shaft" just expresses that a traction control is taking place, i. e. a wheel spin was detected.

- 2.2 The subject-matter of independent claim 1 differs from the disclosure of D2 in that the controller actuates and controls **said power output device to restrict the driving force output to the drive shaft** (instead of said mechanical braking device) in response to detection of a slip by said slip detection module.
- 2.3 The problem to be solved by the present invention may therefore be regarded as how to provide an alternative means of controlling a slip caused by spin of the drive wheels.

2.4 There exists a variety of so-called traction control systems which control wheel spin due to excessive engine torque, and it is well-known for the skilled person that wheel spin control can be performed through engine and/or brake control.
As an example, D3 shows (see Fig.2) that engine torque is reduced when excessive wheel spin is detected, in parallel with brake control.

2.5 Therefore the features disclosed in D2 and D3 would be combined by the skilled person, without exercise of any inventive skills in order to solve the problem posed, thereby arriving at a solution where a controller also (or alternatively) restricts the driving force output in response to a detection of wheel spinning.

The proposed solution in independent claim 1 as well as in the corresponding method claim 9 thus cannot be considered inventive (Article 33(3) PCT).

3. Dependent claims 2-7, 8 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

3.1 Braking in response to detected reverse running - according to the additional features of claim 2 - is known from D1 (col.2, line 3).

3.2 The additional feature of claims 3 and 4 are known from D4 (claim 10), where the vehicle rolling backwards is slowed down to a preset minimal speed.

3.3 Braking a vehicle on a slope dependent from the road surface gradient, as claimed in claim 5, is disclosed in D2 (see Fig.7).

3.4 The additional features of claims 6 and 7 are known from D2 , i. e.

- detecting the set running direction (see col.7, line 11-14)
- detecting slip-down based on vehicle speed measurement (col.7, line 29-32)
- estimating road surface gradient (Fig.7) based on a relation between vehicle acceleration and driving force output (which is a method known to the skilled person)

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- applying a braking force corresponding to a product of a balancing force and a ratio specified according to the measured vehicle speed in the reverse direction (which is obvious for the skilled person, especially when taking into account D4).

3.5 Braking the non-driven wheels according to claim 8 is disclosed in D1 (see above).

device to make the vehicle speed in the reverse direction approach to a preset vehicle speed.

8. A vehicle in accordance with any one of claims 1 to 4, wherein said mechanical braking device comprises a brake that applies a mechanical braking force to driven wheels, which are different from the drive wheels.

9. A control method of a vehicle, said vehicle being equipped with a power output device that is capable of outputting a driving force to a drive shaft linked with drive wheels, and with a mechanical braking device that is capable of applying a mechanical braking force to said vehicle, said control method comprising the steps of:

- (a) detecting a slip caused by spin of the drive wheels;
- (b) actuating and controlling said power output device to restrict the driving force output to the drive shaft, in response to detection of a slip in said step (a);
- (c) detecting a slip-down of said vehicle; and
- (d) actuating and controlling said mechanical braking device to apply a mechanical braking force to said vehicle, in response to detection of a slip-down of said vehicle in said step (c) under restricting the driving force output to the drive shaft in said step (b).

10. (New) A vehicle in accordance with claim 1, wherein

said power output device includes an electric motor that is capable of inputting and outputting power from and to said drive shaft.

5 11. (New) A vehicle in accordance with claim 9, wherein said power output device comprises: an internal combustion engine;

 a three-shaft power input output module that is connected with three shafts, that is, an output shaft of said internal
10 combustion engine, said drive shaft, and a third shaft and, when powers input into and output from any two shafts among the three shafts are specified, determines power input into and output from a residual shaft, based on the specified powers;

 a generator that is capable of inputting and outputting
15 power from and to said third shaft.

 12. (New) A vehicle in accordance with claim 9, wherein said power output device comprises: and internal combustion engine; and

20 a pair-rotor motor having a first rotor, which is linked with said output shaft of said internal combustion engine, and a second rotor, which is linked with said drive shaft and relatively rotates through electromagnetic interaction between the first rotor and the second rotor.